APPENDIX E
STANFORD'S JANUARY 6, 2011 DOCUMENT ENTITLED "THE FUTURE OF SEARSVILLE DAM AND RESERVOIR"

The Future of Searsville Dam and Reservoir

Over the last 15 years, Stanford University has conducted technical studies and gathered data and community input on the Searsville Dam and Reservoir. We are now initiating a process that will result in a plan for addressing the long-term future of the dam and reservoir. During this process, a multidisciplinary team of Stanford staff and faculty will assess the functional objectives of the Searsville Dam and Reservoir in light of the needs of the University, the surrounding community, and the environment. Factors to be considered include the University's research and academic programs at the Jasper Ridge Biological Preserve; the University's water supply and storage needs; biological diversity, including both the habitats and wetlands created by the reservoir as well as potential fish passage upstream of the dam; possible effects on upstream and downstream flood risk; and the cost and impact of sediment removal, disposal and ongoing management. Action alternatives include maintaining the current state of the dam and reservoir, removing sediment from the reservoir to restore some or all of its original capacity, modifying the dam, removing the dam, or combinations of these actions. Alternatives will be evaluated to identify the approach that best achieves the objectives and minimizes tradeoffs between them. We anticipate completing a concept alternatives study based on this analysis in approximately 2 years, to be followed by a collaborative review process with various agencies and public stakeholders, leading ultimately to project implementation. More details of the full process are provided below.

Background

Searsville Dam was completed by the Spring Valley Water Company in 1892, which contracted with Stanford at that time to supply the University 344 million gallons of water per year, its entire original capacity. The University purchased the dam in 1919. By the 1930s, the reservoir had lost half its original capacity due to accumulating sediment from upstream, and today its volume is about 10 percent of its original capacity. Without remediation, sedimentation will continue to fill the reservoir. Despite the sedimentation, however, Searsville continues to serve as a water source (typically hundreds of acre-feet per year) for the University, and its value as a potential long-term and significant sustainable water supply is important.

The dam is in sound structural condition; it performed well in both the 1906 and 1989 earthquakes. The dam is annually inspected by the State's Department of Water Resources, Division of Safety of Dams. A routine below-water level inspection of the dam is due, and is being scheduled by Stanford and the state.

Stanford is awaiting approval of its Habitat Conservation Plan (HCP), which provides a comprehensive conservation program for five protected species, including steelhead. If approved, federal wildlife agencies will issue incidental take permits that will authorize the "take" of these species during the course of the activities described in the HCP. If a new action is proposed at Searsville Dam and Reservoir, it will need to comply with the Endangered Species Act, and obtain a federal incidental take permit, in addition to complying with other local, state, and federal regulations. Stanford has proposed in the HCP to study the technical feasibility of

fish passage alternatives in conjunction with any future Stanford or agency proposals to modify Searsville Dam, or within 10 years if no proposal is made.

Several faculty members have expressed interest in the challenges of determining the future of Searsville. In addition, faculty members have expressed interest in pursuing associated academic research opportunities.

Issues

The issues surrounding Searsville are very complex and include the following:

Academic Resources / Resource Conservation.

Jasper Ridge Biological Preserve. As noted in Jasper Ridge Advisory Committee's position paper of October 2007, "Searsville Lake provides a number of important benefits to the Preserve. Ecologically, it supports a range of habitats, including the reservoir itself, the associated wetlands, and all of the habitats with species that use the reservoir and wetlands for feeding or breeding…As a consequence, Searsville Lake is a unique educational and research resource. It provides opportunities for students to have direct experience with a range of globally and locally important habitats, environmental issues, and engineering topics...Recent projects have pursued questions in biogeochemistry, hydrology, atmospheric chemistry, remote sensing, animal behavior, and sedimentology."

Protected Species. San Francisquito Creek, located downstream of Searsville Dam, supports steelhead and California red-legged frog, which are protected under the Endangered Species Act. In addition, it provides habitat for western pond turtle, which is a candidate species for protection. The dam has blocked upstream fish passage since its construction in 1892; however, potential steelhead habitat exists upstream of the dam.

Cultural Resources. Searsville Dam may also be a significant historic structure subject to protection as a cultural resource. The dam is a very early example of a poured-in-place concrete block dam and is listed on the State of California Historic Resources Inventory. There are other historic properties and archaeological resources in the immediate vicinity of the dam as well. These historic features are also important resources for research in the areas of engineering, hydrology, history and archaeology.

Water Supply. Even with Searsville's declining water storage volume, the facility remains an active and valuable sustainable water resource for the University. Water originating from the Searsville diversion is currently used for irrigation of Stanford's extensive agricultural fields, plant nurseries, golf course, athletic fields, and campus landscaping. The water supply function requires a point of diversion and storage capacity, which are presently provided by the Searsville diversion at the dam, and the reservoir itself. Water from the Searsville diversion is important as a non-potable water supply; however, with treatment, it could also constitute a potable water supply.

***Flood Protection*.** Searsville Dam was not engineered or constructed, or ever operated, to function as a flood control facility. Several creeks flow into Searsville, most notably Corte Madera, Sausal, Dennis Martin, and Alambique. The creeks' flows range from hundreds of cubic feet per second in winter storms to barely a trickle in the summer. Searsville Reservoir fills up and spills after just the first few storms, and remains full and spilling through the rainy season and into early summer. Flow data from recent significant storms at both the dam and downstream in San Francisquito Creek indicate the possibility of a slowing down of flow caused by the sediments, marshes and vegetation upstream of the dam, possibly resulting in somewhat reduced peak flow and possibly delayed flow to San Francisquito Creek; however, the extent of this effect in major storms is unknown. Whether Searsville Dam and Reservoir could be modified to alleviate upstream flooding risk and/or provide downstream flood control benefits is extremely complex and requires significant hydrologic and engineering analyses.

***Sediment Management*.** Searsville Dam has retained much of the sediments carried by its tributary creeks for more than 100 years, resulting in the reduction of water storage capacity and in the development of forested wetlands and related ecology. Urban development downstream of the dam occurred over those same 100+ years under conditions of decreased sediment load. Sediment management issues exist both with the disposal of the sediment that has accumulated behind the dam and with the ongoing sediment that will be transported annually by contributing streams, and the potential impact of that sediment on downstream creek conditions.

***Liability*.** The University's potential liability for Searsville and for any possible contemplated action, including removal, will have to be carefully evaluated as an integral part of all studies and analyses.

Study Objectives

Searsville has evolved from its initial 1892 purpose of water diversion and storage to include other functions and ecological features. The unintended functions include sediment trapping, and possibly, to some unknown extent, flood water detention. Biological features that have established adjacent to the open water of the reservoir include fresh water marsh and forested wetlands. Two other consequences of the dam's construction have been potential hydrologic changes immediately upstream of the reservoir, and obstruction of fish passage from below the facility to the tributary creeks above it.

The analysis of the previously identified issues will be used to define a set of quantifiable functional objectives that best achieve Stanford's interests in resource conservation, academic programming and watershed management, balancing tradeoffs that may need to occur between competing objectives. The determination of the right approach at Searsville is complicated because of the potential incompatability of these functions.

Possible actions

Once functional objectives have been established, Stanford will evaluate alternative actions to determine how they might achieve the objectives. Based on work that has been conducted to date, the following general alternative actions are anticipated to be included for additional study:

1. *No Action*: Allow the reservoir to fill with sediments and transition to marsh and forested wetlands.
2. *Leave the dam and remove sediment*: Maintain the reservoir, ranging in capacity from its current size to its original capacity, and continue periodic sediment removal.
3. *Alter the dam and remove sediment*: Modify the dam and reservoir to enable them to be operated for upstream and/or downstream flood control and sediment management in addition to water supply/storage.
4. *Remove the dam*: Allow Corte Madera Creek and the other creeks to flow downstream.

Technical Studies

Technical analyses and other studies of the Searsville area have been conducted over at least the last 15 years. Stanford's expanded effort will build on past studies of biological and hydrological conditions in the vicinity of the reservoir. Technical study components include:

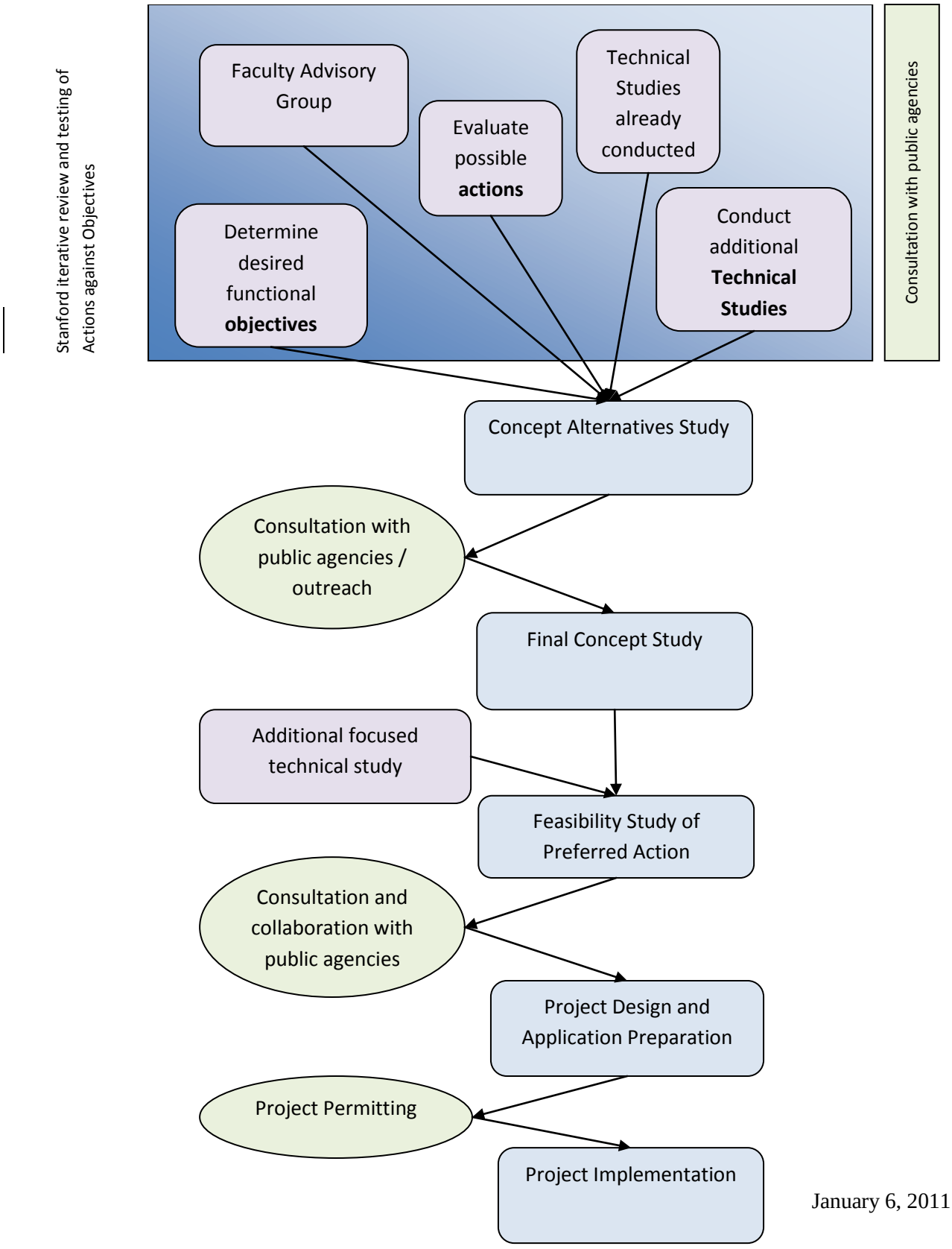
- Hydrology - surface water: water supply/storage, alternative diversion/storage configurations, flood control benefits (refine previous analyses)
- Hydrology - groundwater: consequences of dewatering reservoir
- Geotechnical: nature of sediments, removal process options, drying time frame and dredging spoils drying bed configurations/locations, possible uses, stockpile location options, ongoing sediment management
- Structural: for any dam modification or removal options
- Civil: bypass/fish ladder configuration, sediment disposal, conveyance, and site work
- Biological resources: fish ladder/passage design criteria, and analyses of all effects on wetlands, biotic communities, and listed and non-listed species
- Cultural resources: analyses of historic and archaeological resources and potential impacts
- Legal: liability and approvals/permitting aspects
- Cost: estimated cost and cost/benefit analyses
- Construction: methodology options, logistics, and impact minimization

Process

Figure 1 provides a flowchart of the process to be undertaken to determine the future of the Searsville area. In order to create the concept study, the development of the objectives for the area, the possible future actions, and the technical studies will be analyzed and refined to identify the possible options that will best meet the selected objectives. Initially, an internal Stanford study effort will include staff and consultants interacting with a Stanford faculty advisory group formed to participate in scoping, review, and evaluation of the concept study components. During the development of the concept study, Stanford will consult with federal, state, and local agencies to review the findings to date and obtain the agencies' perspectives about both the objectives and possible actions. Once the concept alternatives study is completed (in approximately 2 years), Stanford will conduct public outreach to communicate preliminary findings of the analysis and receive feedback. Following that phase, the concept study will be finalized, and a feasibility study of a preferred action will be prepared, incorporating additional required technical studies. Stanford will consult with the same agencies to review the findings of

the feasibility study. The final phases of this process are project design, preparation of appropriate project applications, project permitting and implementation. A project of this complexity and regional interest will take many years for design, environmental review, and permitting, and Stanford is committed to a thorough, collaborative, and open approval process for determining the future of Searsville.

FIGURE 1. THE FUTURE OF SEARSVILLE DAM AND RESERVOIR PROCESS DIAGRAM



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